Name: _____ Class: _____ Date: _____

Unit Rates and Proportions

Example 1: Sam paid \$4.95 for $\frac{3}{4}$ pound of his favorite trail-mix. What is the unit price (dollars per pound)?

Solution: The unit price is $\frac{\$4.95}{\frac{3}{4}\text{ pound}}$. To create a unit rate we need a denomintor of "one."

$$\frac{\$4.95\cdot\frac{4}{3}}{\frac{3}{4}\text{ pound}\cdot\frac{4}{3}}=\frac{\$4.95\cdot\frac{4}{3}}{1\text{ pound}}=\$4.95\cdot\frac{4}{3}=\$6.60$$

Example 2: Based on the table, what is the unit growth rate (meters per year)?

Height (m)	15	17
Years	75	85

+2 (over 15 → 17)

+10 (over 75 → 85)

Solution:

$$\frac{2\text{ meters}}{10\text{ years}}=\frac{2\text{ meters}+10}{10\text{ years}+10}=\frac{\frac{1}{5}\text{ meter}}{1\text{ year}}=\frac{1}{5}\ \frac{\text{meter}}{\text{year}}$$

Note: This same information could be determined by looking at a graph.

Example 3: In line at the movies are 146 people in front of you. If you count 9 tickets sold in 70 seconds, how long will it take before you buy your ticket?

Solution: The information may be organized in a proportion $\frac{9\text{ tickets}}{70\text{ seconds}}=\frac{146\text{ tickets}}{x}$. Solving the proportion $\frac{9}{70}=\frac{146}{x}$ yields $9x = 10220$, so $x \approx 1135.56$ seconds or ≈ 19 minutes.

Solve the following problems on a separate piece of paper. You may use a calculator, but show all work.

12. The tax on a \$400 painting is \$34. What should be the tax on a \$700 painting.

13. Use the table at right to write and solve a ratio for how long it will take Isadora to earn \$120.

\$ Earned	35	52.50	105
Days Worked	4	6	12

14. While baking, Hannah discovered a recipe for cookies that required $\frac{3}{4}$ cups of sugar for every $2\frac{1}{4}$ cups of flour. How many cups of sugar will she need for 4 cups of flour?

15. My brother grew $1\frac{3}{4}$ inches in $2\frac{1}{2}$ months. If he continues to grow at the same rate, how much should he grow in one year?

16. On his afternoon jog Chris took 42 minutes to run $3\frac{3}{4}$ miles. How many miles can he run in 90 minutes?

17. If Caitlin needs $1\frac{7}{8}$ cans of paint for each room in her house, how many cans of paint will she need to paint the 9-room house?

18. Stephen receives 6 gumballs for every two hours of homework he does. If he wants 22 gumballs, how many hours will he need to work?